chaine apparition de la saccharine sera la bienvenue."

The writer of the French article suggests that it might be well, perhaps, to utilise the saccharin solely for mixing with sugar, as is done in Italy. This economises sugar, since a smaller "ration" will suffice, and is better than selling a substance which has no nutritive value at all. Moreover, it would diminish the rather unpleasant after-taste of saccharin used alone, and would also facilitate the employment of certain nourishing foodstuffs, such as cocoa, rice, and farinaceous foods, which require sweetening to make them palatable to most people. A suggestion that saccharin might be therapeutically objectionable is dismissed as of no serious weight, in view of the experience obtained with it in the past.

In this country saccharin has already been employed to a small extent in a somewhat similar manner, namely, to sweeten milk-sugar for sale as a sugar substitute. The supply of milk-sugar, however, is restricted. If our own authorities have not already done so, they might perhaps find it worth while to consider the plan suggested by the French writer. Five hundred pounds of sugar *plus* 1 lb. of saccharin would have about the same sweetening value as 1000 lb. of sugar used alone.

NOTES.

THE trustees of the British Museum have been given notice by the Government that the museum is to be requisitioned as the headquarters of the Air Board. This decision will be received with dismay by everyone who possesses intellectual interests or understands the value of the collections in the galleries of the great building at Bloomsbury. To pack up and store away the many fragile objects in the museum in order to prepare the galleries for occupation means ruin to the specimens, and the ruthless undoing of careful organising work of many years. Sir Arthur Evans, president of the British Association, and one of the trustees of the museum, writes to the *Times* of January 2 to protest against the wanton sacrifice of national treasures involved in the hurried removal of specimens from their cases, or the alternative of letting them remain while the building is used as the headquarters of a combatant department. "Even the bare statement of this proposal," he remarks, "will cause a shudder to run through all civilised countries. Were it carried out it would cover the British nation with lasting obloquy. I write this with the hope that even at the eleventh hour the Government may recoil from a step which could not but provoke a deep and widespread indignation." If the British Museum represented the last extremity in housing the Air Board, the occupation of the building would have to be accepted as an inevitable consequence of conditions of war. We have not, however, reached a degree of national stress which would justify the outrage now contemplated; and we trust that immediate steps will be taken to induce the Government to find a domicile for the Air Board without dismantling our national museum and ruining many of the priceless treasures collected within its walls.

A LONG list of New Year honours was published on Tuesday. Among the names included the following will be familiar to scientific workers:—*K.C.B.* (*Civil Division*): Mr. A. D. Hall, F.R.S., Secretary to the Board of Agriculture; Sir George Newman, Principal Medical Officer to the Board of Education. *C.B.* (*Civil Division*): Mr. F. L. C. Floud, Assistant Secretary to the Board of Agriculture. *Baronet:* Prof. James Ritchie, Irvine professor of bacteriology, University of Edinburgh. *C.I.E.:* Mr. P. H. Clutterbuck, Indian Forest Service, Chief Conservator of Forests, United Provinces. *Knighthoods:* Mr. W. N. Atkinson, who has contributed largely to a knowledge of the dangers of coal-dust in mines; Dr. J. Scott Keltie, editor of "The Statesman's Year-Book," and for many years secretary of the Royal Geographical Society; Dr. A. Macphail, professor of the history of medicine, McGill University, Montreal. In addition a large number of medical men have received honours for services rendered in connection with military operations in the field.

THE report on the production of iron and steel in Canada during the calendar year 1916, which has just been issued by the Canadian Department of Mines, is of exceptional interest at a time like the present, when the preponderating influence of iron output upon the European war is daily becoming more evident. The main outstanding fact is that the production of pig-iron was just above one million statute tons, being an increase of 27·9 per cent. as compared with that of 1915. Only a small proportion, about 10 per cent., of the iron ore smelted was produced in Canada, a little more than half the remainder being Lake ore from the United States, smelted mainly in Ontario, and the rest consisting of Wabane ore from Newfoundland, smelted in Nova Scotia. Thus fully half the ore smelted is of British origin. The total production of iron ore in Canada was only about 250,000 statute tons, approximately one-half of which was smelted within the Dominion and one-half exported to the United States. It is noteworthy that Canada produced in the year in question 28,628 tons of ferro-alloys, including ferro-silicon, ferro-molybdenum, and ferro-phosphorus, smelted in electric furnaces. The total steel production of Canada was 1,428,429 short tons of ingots and castings, being an increase of 40 per cent. above the previous year; of this amount 1,397,703 short tons were ingots, the remainder being castings. Practically all this is open-hearth steel, only 1400 tons of Bessemer steel having been made, whilst about 26,000 tons of steel were made in electric furnaces. The quantity of scrap worked up is quite considerable, amounting to about 47 per cent. of the steel produced and 71·5 per cent. of the pig-iron charged. The increase in production shown all round is very satisfactory, and indicates how energetically Canadian ironmasters have striven to contribute to the Imperial output of this all-important material. There is also a highly significant piece of information, namely, that the production of iron ore in the United States in 1916 was as much as 75½ million statute tons, or an increase of twenty million tons above the 1915 production; seeing that the iron in this increase is by itself nearly equal to the whole iron production of Germany, it is very evident that the part that America can play in the great war is likely to prove a decisive factor before very long.

WE learn with regret that Prof. C. Christiansen, professor of physics in the University of Copenhagen from 1886 to 1912, died on December 28, at seventy-four years of age.

THE *Chemist and Druggist* announces that Dr. M. Louis Martin, head of the Pasteur Hospital at Paris, and Prof. Albert Calmette, director of the Pasteur Institute at Lille, have been unanimously elected subdirectors of the Paris Pasteur Institute in succession to the late Profs. Metchnikoff and Chamberland.

AFTER a succession of shocks, which began early on December 26, Guatemala City was destroyed by an earthquake on Saturday, December 29. It is reported that the whole city is in ruins, and that at least one thousand people have been killed.

MR. E. E. LOWE, honorary secretary of the Museums Association, has been invited by the Ministry of Food to organise and control food economy exhibitions throughout the country. The Leicester Museum and Library Committee has released Mr. Lowe temporarily in order that he may undertake this important national work.

MAORI pictographs have long been known to exist in the limestone caves and rock-shelters of the South Island, New Zealand, but recent examination by an American ethnologist, Dr. Elmore, has proved them to be of unexpected interest. On the suggestion of Dr. Benham, the museums of Wellington and Auckland have joined forces with the Otago Museum, and have removed a number of slabs from the caves for permanent preservation in the three museums.

ON January 2 the Institution of Civil Engineers completed the hundredth year of its existence, having been established in 1818 at a meeting of eight engineers at the Kendal Coffee House in Fleet Street. At the next ordinary meeting of the institution on January 8, before the discussion of papers, a statement commemorative of the founding of the institution will be made, present conditions precluding more formal celebration of the centenary.

MR. T. F. CHEESEMAN, author of the "Manual of the New Zealand Flora," has formed by his own private efforts, extending over forty-five years, a large collection of New Zealand plants. To this the trustees of the British Museum, in recognition of Mr. Cheeseman's valuable help, have recently added a nearly complete set of the plants collected in New Zealand by Banks and Solander (1769–70). The collection and its cabinets now occupy a room 25 ft. long, and Mr. Cheeseman has offered to present the whole to the Auckland Museum, of which he is curator, if that institution will engage to place it in a separate room and maintain it as a public herbarium. Since there is as yet no botanical museum in New Zealand, this offer is certainly one to be accepted.

THE report of the council of the Scottish Meteorological Society, adopted at the general meeting of the society held on December 20, states that the council has continued to keep steadily in view the encouragement of rainfall observation in Scotland, and there are available in the Journal monthly and annual figures for fully 750 stations. Much time has been devoted to tabulating and arranging the great mass of rainfall statistics now available. There are at present 261 members of the society, of whom eighty-one are life members. The council for the ensuing twelve months is constituted as follows:—*President:* Prof. R. A. Sampson; *Vice-Presidents:* Mr. M. M'Callum Fairgrieve and Dr. C. G. Knott; *Council:* Prof. T. Hudson Beare, Dr. J. D. Falconer, Mr. J. Mackay Bernard, Mr. D. A. Stevenson, Mr. R. Cross, Mr. S. B. Hog, Mr. G. Thomson, Dr. A. Crichton Mitchell, and Mr. G. A. Mitchell; *Hon. Secretary:* Dr. E. M. Wedderburn; *Hon. Treasurer:* Mr. W. B. Wilson.

THE last report of the Bristol Museum and Art Gallery describes an excellent scheme for popularising the collections. A large hall capable of accommodating 300–400 wounded soldiers was opened. The men were received by guides, who explained the pictures and exhibits; lantern lectures and demonstrations by members of the staff were organised, and the scheme was supported by the Lord Mayor and other leading citizens. "The keen interest and enthusiasm of the soldiers reacted upon the staff, who found the work a delight, and many men returned on leave-days to continue the studies thus begun."

IN this country we are unfortunately still prone to regard our museums as places of "innocent amusement" rather than as centres of education. It is otherwise in America. There the Natural History Museum, for example, is regarded as an indispensable factor in national well-being, serving both as a centre of instruction to the general public as to the natural resources of the country, and as the repository of the material necessary to those engaged in the development and conservation of such resources. To further these aims the American Museum of Natural History publishes an admirable *Museum Journal,* ably written and most profusely illustrated. The November issue of this journal well demonstrates the range of these activities, for it contains, among other things, a number of exceptionally fine photographs of the bird-life of the Falkland Islands, including nesting colonies of penguins, king-shags, and giant petrels, and two valuable accounts of explorations in New Mexico and the Navaho region. The former deals with the ancient and buried cities of the La Plata region, while the latter describes the customs of the Navaho Indians, incidentally directing attention to cave-dwellings of extinct peoples awaiting investigation.

THE theory that early society was organised on the patriarchal model, popularised by Sir H. Maine in his work on "Ancient Law," was generally accepted until the priority of matrilinear kinship was urged by writers like Bachofen and McLennan. Their view was supported by the investigations into the organisation of the Central Australian tribes by Messrs. Spencer and Gillen. At present among European anthropologists the priority of matrilinear kinship is generally recognised. But two eminent American anthropologists, Dr. Lowie and Dr. Swanton, have questioned its existence among the American Indian tribes. Their conclusions have been criticised in an elaborate paper by Dr. E. Sidney Hartland (Memoirs of the American Anthropological Association, vol. iv., No. 1), in which he proves that in most of these tribes there is evidence of a previous stage of matrilinear organisation, and, where it is wanting, its absence is due to vicissitudes and external influences to which these tribes have been exposed.

UNDER the name of the "Inometer," Prof. T. Johnson, of the Royal College of Science for Ireland, has introduced a new form of food chart, constructed on the principle of the thermometer. The degrees on the scale represent large Calories, and the principal points are placed at 4000 Cal., 3500 Cal., 3000 Cal., 2500 Cal., and 2000 Cal. These represent the food energy (expressed in Calories) requisite for the performance of a day's work, ranging from heavy muscular work at 4000 Cal. to sedentary work at 2500 Cal., the energy expenditure of a man resting in bed being placed at 2000 Cal. In addition, there are interpolated at various points on the scale the numbers of Calories furnished by definite quantities of a variety of common foods, together with their cost in Dublin in April, 1917. The chart is accompanied by eight pages of letterpress, in which is given a clear and simple account of the uses of food, together with suggestions for the making up of dietaries, having regard to both the economic and patriotic aspects of food problems in war-time. The pamphlet is published by the Department of Agriculture and Technical Instruction for Ireland, and can be had free on application.

A SHORT paper by Mr. E. S. Goodrich in the *Quarterly Journal of Microscopical Science* (vol. lxii., part 4) throws considerable light on the interesting problem of the homologies of the cœlomic spaces in various groups of the animal kingdom. The "proboscis pores," which lead from the proboscis cœlom to the exterior in Balanoglossus, are believed to be represented in Echinoderms by the water pore, and in Amphioxus by the opening of Hatschek's pit, as originally suggested by Bateson. But the anterior cœlomic sacs of Amphioxus, one of which becomes metamorphosed into Hatschek's pit, are homologous with the premandibular somites of Craniates. The cavities of these somites may develop a tubular connection with the hypophysis, which is to be identified with the proboscis pore of lower forms, while the hypophysis itself is the homologue of the ciliated "wheel organ" in the buccal cavity of Amphioxus. These views are supported by an interesting reconstruction of part of the head of an embryo torpedo.

IN the Transactions of the Royal Society of South Africa (vol. vi., part 1, 1917) Mr. P. A. Wagner publishes an exhaustive monograph on the national game of skill of Africa. The game, in one form or the other, is played in rows of holes scooped out of the ground, or on wooden, stone, or even ivory boards. As a matter of fact, it is not confined to Africa, being played in Syria, Arabia, Bombay, Ceylon, the Malay Peninsula, and along the entire southern coast of Asia as far as the Philippine Islands. It is essentially a war game, two players, or sides, directing a contest between armies of equal strength, the object being the capture or "killing" of "men," who are represented by small stones, seeds, shells, or fragments of dried cow-dung. It is often played for a stake, but it is certainly not a gambling game, as some writers have maintained. It is also incorrect to say that it is very intricate, though it does require a certain facility in ready reckoning. It is of considerable antiquity, being known to the Arabs of the Middle Ages, and stone boards and fragments of others have been found in the neighbourhood of ancient ruins in Rhodesia. The problem of the methods by which this game appears in such a wide area is interesting, but is not dealt with by Mr. Wagner.

IN a study of the natural regeneration of the Douglas fir and other conifers in the Pacific coast forests of the United States, published in the *Journal of Agricultural Research*, vol. xi., pp. 1–26 (October, 1917), J. V. Hofmann shows that when a large area is either burnt or cut away, the complete restocking which usually takes place does not result from the seeds that are scattered by surviving trees on the area or in its vicinity. The distance from the parent tree to which seed is carried by the wind is very small, 150 to 300 ft. Consequently, if only wind-dispersed seed germinated, the regeneration of a large area would not be completed until after the growth of several generations of trees. The reproduction is never a gradual creeping out from surrounding bodies of green trees, but is a sudden taking possession of the whole area by a dense growth of seedlings. The regeneration is really effected by the seed which is stored in the ground amidst the litter and humus, which are not destroyed in the swift passage of the ordinary forest fire. The litter is found on examination to contain a large number of germinable seed. The ordinary form of succession is the replacement of the forest almost immediately by the same species as composed the original stand, and usually in the same proportions. This paper is well illustrated with diagrams and photographs. One plate is a view of the reproduction on the Yacolt "Burn" of 1902 in the Columbia National Forest. The extent devastated by fire is 604,000 acres. No green trees are visible, yet there are seedlings growing among the snags over the whole area.

PROF. P. L. MERCANTON, in the *Revue générale des Sciences* for November 30 last, discusses the results of the more recent observations on the advance and retreat of glaciers, especially Alpine. Systematic work was begun by Prof. Forel thirty-seven years ago in the Swiss Alps, and for at least thirty of them the movements of the Rhone Glacier and the two at Grindelwald have been carefully noted. Those on the northern side of Mont Blanc have also been studied, and similar work is now being carried on in other icefields. But the main advances and retreats of those glaciers and a few others in the Alps are known for fully three centuries, and estimates of their periods have been attempted. These do not correspond with Wolf's eleven-year period, or with the thirty-five-year one of Brückner. Some causes affect their movements other than the snowfall in the upper region—that of the névé—and the ablation due to temperature changes in the lower; for of two adjacent glaciers, one may be advancing while another is retreating. Recent observations, as Prof. Mercanton points out, indicate that the volume and the length of a glacier can to some extent vary independently, or, in other words, that the ice moves down a valley from the more expanded névé basin at its head, not with perfect uniformity, but with local intermittence, so that a belt near the end may be swelling up in a wide mound, and thus the actual volume of ice be increasing, while the end itself is in retreat. Evidently, as Prof. Mercanton observes, the subject of glaciers and their history is not yet exhausted.

PROF. FILIPPO EREDIA has recently published in the *Bollettino d'Informazione* of the Italian Colonial Office a useful note on the frequency of snow in Tripoli and in Algeria. In the last-named country at sea-level snow is rare, since only one fall in the whole year may be expected. At a height of 600 metres six falls per annum occur on the average, while at double this elevation twenty-five falls are experienced. In Algeria and Tunisia the most frequent and extensive snowfalls occurred in the winter of 1890–91, while 1884, 1904–5, 1913, and 1915 were also characterised by abundant snowfalls. Some interesting photographs are given of snow scenes in Tripoli during the snowstorms of February, 1913, and February, 1915.

AN interesting instance of the way in which the solution of a problem in one branch of science provides or aids in the solution of a problem in an entirely different branch was brought before the Institution of Mechanical Engineers on December 14 by Messrs. Griffith and Taylor in a communication entitled "The Use of Soap Films in Solving Torsion Problems." The authors show that the equations which determine the stress in a rod of any section subjected to twist are identical with those which determine the slope of a soap film formed in a hole of the same shape as the section, in a horizontal plate above which it protrudes owing to a small excess of pressure on the under-side of the film. The slope of the film at any point is found by an optical method, and a number of diagrams of the contour lines for various sections are given. The diagrams thus obtained lead to a general method of calculating the torsional strengths of rods of difficult sections, which gives results much more accurate than those at present in use.

MESSRS. P. L. GAINEY and L. F. Metzler are the authors of an interesting article entitled "Some Factors affecting Nitrate-Nitrogen Accumulation in Soil" in the *Journal of Agricultural Research* (vol. xi., No. 2). The soil employed in the work described was an Oswego silt loam, and some preliminary experiments led to the conclusion that the amount of nitrate produced is independent of the quantity of soil, of its depth (provided the soil was left loose), of the ratio of the exposed surface of the soil to its weight, and of the shape and size of the containing vessel. These points having been determined, experiments were made to ascertain the effect of variations of the depth of column, moisture content, and compactness of the soil upon nitrate accumulation. From the results of these experiments the following conclusions are drawn: First, that the amount of nitrate increases with the compactness of the soil, provided that the latter is not saturated with moisture. Secondly, the optimum moisture content of the soil (with any degree of compactness tested) is approximately two-thirds of the total amount of moisture it will retain, and provided the moisture present does not exceed this optimum, the aeration will be adequate to a depth of one foot, however compact the soil. Thirdly, the accumulation of nitrate increases with increasing depth down to 2 ft. so long as the moisture does not exceed two-thirds saturation. Fourthly, that nitrate accumulates more rapidly in unbroken soil columns than in pulverised soil (in a column of soil uncultivated for seven years aeration was far greater than that required to maintain aerobic conditions). The authors point out that such beneficial effect as cultivating the soil may have upon its biological activity cannot be attributed to increased aeration, because the experimental data available for normal field soils indicate that obligate aerobic conditions almost invariably exist within the first foot of surface.

IN the *Atti dei Lincei*, vol. xxvi. (2), 6, Dr. Quirino Majorana describes an experiment performed with the object of testing whether reflection from a mirror in motion affects the velocity of light. For this purpose a number of mirrors were arranged symmetrically round a rapidly revolving wheel, so that a pencil of light could be reflected from a moving mirror, then from a fixed mirror, then from another moving mirror, the process being repeated any desired number of times so as to increase the effect, and the mirrors having a component velocity in the direction of the ray, and in a sense depending on that of the rotation. The change in the wave-length produced by the rotation was observed by a Michelson interferometer, the object being to ascertain whether this change was or was not the same as would take place if the velocity of light remained constant. Although the limits of error were considerable, it was found that the results led to the conclusion that reflection from a moving mirror does not change the velocity of light relative to the surrounding medium.

MESSRS. C. GRIFFIN AND CO., LTD., are about to publish "Transmission Gears: Mechanical, Electric, and Hydraulic, for Land and Marine Purposes," by E. Butler, and new editions of "Coast Erosion and Protection," by Prof. E. R. Matthews; "Mechanical Engineering for Beginners and Others," by R. S. McLaren, and "Treatise on the Principles and Practice of Harbour Engineering," by Dr. Brysson Cunningham. *Messrs. Crosby Lockwood and Son* announce a "Glossary of Aviation Terms" and "Aviation Engines," the former by Lieut. V. W. Pagé and Lieut. P. Montariol, and the latter by Lieut. Pagé. The same firm will also issue a new edition of "Refrigeration, Cold Storage, and Ice-making," incorporating the fourth edition of "Refrigerating and Ice-making Machinery," by A. J. Wallis-Tayler. "A Text-book of Naval Aeronautics," by H. Woodhouse and others, is promised by *Messrs. T. Werner Laurie, Ltd.*

OUR ASTRONOMICAL COLUMN.

NEW STARS IN SPIRAL NEBULÆ.—A full account of the discovery of a new star in the spiral nebula N.G.C. 4527 is given by Dr. H. D. Curtis in Lick Observatory Bulletin, No. 300. Photographs from various sources show that there was no trace of the star from early in 1900 until March 20, 1915, when it appeared to be of about 14th magnitude. On April 16 of the same year it had fallen to 15th magnitude, and was not certainly recognised in later photographs. Two novæ were afterwards discovered in photographs of N.G.C. 4321, and of these also the history is fairly complete. Including Ritchey's nova in N.G.C. 6946, six novæ have now been discovered in spiral nebulæ, four of them about 14th magnitude, and two brighter, one of the latter being observed in the Great Andromeda nebula in 1885. Dr Curtis considers that the appearance of these novæ strongly supports the view that the spiral nebulæ are "island universes." The average maximum brightness of novæ which have appeared in our own galaxy is about magnitude 5, and if the galactic and spiral novæ have the same absolute brightness, the difference of about 10 magnitudes indicates that the spiral nebulæ in question are of the order of 100 times as far away as the galactic novæ, which are themselves known to have been very remote. Five additional novæ in spirals are included in a list given in *Popular Astronomy*, vol. xxv., p. 632.

"COMPANION TO THE OBSERVATORY FOR 1918."—The issue of this publication for 1918 closely resembles those of previous years. In addition to a convenient series of tables relating to the sun, moon, and planets, and the satellites of Jupiter and Saturn, it includes an extensive catalogue of meteor radiants, and tables giving the times of minima or maxima of a large number of variable stars. The list of double stars has been improved by the addition of the periods of revolution, so far as they have been determined, and it now includes practically all the visual binaries of known period. There is also a useful table of astronomical constants.

HYDERABAD OBSERVATORY REPORT.—The report of the director of the Nizamiah Observatory, Hyderabad, for the year ending October 5, 1917, is chiefly noteworthy as indicating that great progress has been made with the astrographic work. The catalogue for zone −17° has been finally passed for press, and the greater part of that for −18° is also in the hands of the printers. For zone −19° 131 plates, containing 46,186 stars, were taken, measured, and reduced during the year, and fifty-three plates for zone −20° were also taken and partially measured. Mr. Pocock is to be congratulated on having so quickly brought this institution to a high state of efficiency.